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Chapter

# Telenursing Future in Solving the Nursing Global Workforce Gap

*Zainab Attia Abdallah, Engy Abdel Rahman Khamis,*
*Fatma M. Ibrahim and Ayiat Allah Wagdy Farag*

## Abstract

Although there are 28 million nurses worldwide, it is not enough to meet patient needs. So we face a future with too much work, with too few workers. Telenursing can help in solving this issue by utilizing the technology in providing distance healthcare and health education to patients/clients with lower costs, effective services and proper clients' satisfaction especially in rural areas through insufficient accessibility to local clinics or hospitals. Telenursing can use phone calls, video visits and remote monitoring devices in different nursing fields as family, pediatric, geriatric nursing and/or others. Telenursing can improve the quality of nursing care for patients by building relationships with them and improve the preferable outcomes. Telenursing also can decrease the work burden on nurses and direct contacts with patients with negative related health consequences specially after COVID 19 pandemic.

**Keywords:** telenursing, telehealth, telemedicine, distance healthcare, nursing practice, nursing education, nursing shortage, technology, COVID 19 pandemic

## 1. Introduction

Telenursing means use of digital devices as phone calls, video visits and remote monitoring devices in different nursing fields as family, pediatric, geriatric nursing and/or others. Telenursing means as the nursing services can be provided through electronic platforms, which includes phone calls, video conferences and remote patients' monitoring through different electronic devices. Applying of telenursing in healthcare systems with related health and safety benefits, can provide high quality of life and significant financial benefits to all of patients, family and health and welfare services. It creates the necessary for the development of electronic learning (e-learning) in nursing, telenursing simulation, evidence based nursing practice and nursing research. Telenursing also includes health education services, vital signs' regular remote monitoring, ECG or blood pressure and remote doctor or nurse-patient consultations as needed [1].

According to the American Telemedicine Association, 50% of health services could be provided by telehealth. To cover the needs of healthcare systems and to achieve the balance between the health team workforce and the quality of care, we need to 1.1 million new registered nurses at least. The Global Healthcare Expert, Dr. Mark Britnell, reported that by 2030, the global will face a future with too much

work, with too few workers. He said: "We will reach 18 million health workers short by 2030 and this represents a gap to care." So, the need for solving the nursing and health team workforce become very necessary from now. Appearance of many global technological methods in health care delivery systems through COVID 19 pandemic, may make the problem solution slightly easy [2].

Telehealth offers flexibility and accessibility of patients to their documents and nurses and health care providers safely from home, with more control of their health care. Additionally, nurses can be accessed with telehealth equipment to host virtual meetings with their patients. Using telenursing in providing health care has several advantages as cost savings, convenience, and overcoming patients' care with mobility limitations especially rural areas' citizens who meet difficulties in accessibility to healthcare resources [3].

The integration of telenursing principles in academic programs becomes very necessary to expand the documentation bases for telenursing services and to develop such a new nursing theory involving the impact of telenursing on patient, family, community, health care delivery systems and research protocols. The future challenges in telenursing could be the technological advancement in health care systems and the training of future nurses and health care providers based on clinical simulation and online courses to apply distance-based nursing care [4].

## 2. Overview of telehealth and telenursing

Telehealth or telemedicine is defined as where a health provider can provide care or health services without a direct face-to-face office visit, but from a distance and is done electronically, online with internet access with different devices as a computer, tablet or smartphone. Telemedicine also has many other definitions as Mobile Health or Health Mobile, Telehealth and E-Health. Telehealth Nursing is applying of different telehealth technologies as tools to provide health care in a variety of ways as addressing of social determinants of health such as [5]:

- Access for vulnerable patients and older populations.

- Greater access for rural areas.

- Patients with multiple chronic illnesses with difficulty travel.

- Patient education.

- Remote patient monitoring.

Telenursing refers to using of information technology in providing nursing care and services through mobile devices and computers whenever distance exists between patient-nurse, or between a number of nurses or health care providers. Based on accessibility of mobile devices, telehealth becomes more prevalent as one of healthcare options. Telenursing as a field, is a part of telemedicine, and has a direct and indirect contacts with other medical applications and others of non-medical, as tele-diagnosis, teleconsultation and tele-monitoring. Telenursing enables patients from connecting nurses through mobile devices/applications, video technology, computers and also remote patient monitoring. So healthcare does not be limited to in-patient clinical setting, patient can access nurse and/or primary care providers at any location [6].

There is a variety of tools using in providing health care through telenursing. As well as, nurses can use telenursing for sending information to patients through websites or mobile applications. They can monitor patient condition regularly through remote monitoring. However, telehealth and telenursing are not comprehensive enough and still being developed, they become more utilized than ever as clients are preferring face to face interaction with nurses or other healthcare providers. Recently, telenursing is growing up in many countries. This growing in some countries may be because of the preoccupation in driving down the affordability of health care services, increasing of aging and chronically ill persons and the increase in desiring of coverage of health care to distant, rural areas, small/sparsely populated regions. There are many examples of applying telenursing technology as a tool of providing care as the following [7]:

- Patient education and/or remote patient monitoring.

- Primary care, health promotion, assessment, diagnosis, treatment of and care providing for quarantined patients.

- Tele-nurses or other telehealth provides support and assist providers in remote areas.

- Telenursing in applying school health care.

- Telenursing to prevent and eliminate of direct exposure during epidemics and pandemics such as COVID-19.

## 3. Historical background of telehealth and telenursing

In 1870s, Graham Bell the inventor of telephone carried out the first telephonic call aiming for management of battery acid burns. In 1912, Australian Inland Mission applied nursing care for nurses in remote areas. In 1929, The first telenursing service was through the Trager pedal radio processing services communication between outpost nurses and flying doctors. In 1960 National Aeronautics and Space Administration (NASA) invented and applied a telemedicine to monitor astronauts' health. During 1970s, some health organizations used nurses to give advices through telephone. In 1974, Mary Quinn documented the Logan airport care providing to patients from Boston through telemedicine [5]. In 1997, the Indian Apollo group of hospitals carried out telemedicine via the first outreach use of communication technology. Following that in 2003, a telehealth certificated course was started by Apollo group of hospitals with cooperation with Annamalai University by training of 30 students in each batch. In 2005, International Council for Nurses (ICN) conducted the international telenursing survey which revealed that nearly 719 tele-nurses responded positively. After 2005 and all over the world, telenursing became to be applied more, and nurses and patients' tele-interaction become more noticed and advanced gradually [8]. By spreading of COVID 19 pandemic in the end of 2019, different countries have directed to use innovative methods for fighting against COVID 19 virus. The main challenges for all healthcare systems all over the world were large number of patients, in addition to who could be cared at home, shortage of health team members especially doctors and nurses, lack of intensive care units' facilities and lack of

hospital capacities. Therefore, recent methods had been proposed, tele-nursing was one of the good ways to control COVID 19 pandemic [9].

## 4. Telenursing' legal, ethical and regulatory issues

Telenursing is surrounded by legal, ethical and many regulatory issues, as what happens with telehealth. Those legal issues such as malpractice, negligence and accountability, etc. are also still repeated and difficult to address. Ethical issues also include maintaining autonomy, patient's integrity as well as harmless of clients. In many countries, practical telenursing is forbidden because, the tele-nurse must have a doubled license; one in state/country of residence and another in the location where patient receiving telecare and services. So, the *telenursing licensure* helps in resolving some of these issues [10].

Telenursing professionals store and chart patient data using an electronic medical record (EMR). Transmission of digital clinical data can increase the risk that outside sources may break the confidentiality of sensitive patient information by intercepting and exploiting them. Therefore, tele-nurses should strongly audit all of their current and available security measures and assess how to protect their patient privacy and protection through applying of policies. Most of tele-nurses are working for a hospital or organization which providing them by laptops with a recent and very high level of security and encryption, so that hackers and/or other outside sources cannot intercept patients' confidential sensitive and personal information [11].

Currently, the Health Insurance Portability and Accounting Act (HIPAA) summarize rules and regulations discussing how nurses and healthcare providers protect patients' personal data through storing and sharing. HIPAA declares that patients' identifiable information should to be encrypted so that only the nurses and other healthcare professionals involved in patients' care can access it. In addition to, many other considerations related to the patients' confidentiality and safety of their clinical data [10, 11].

## 5. Types of telenursing delivery models in nursing practice

Mainly, there are three types of Telenursing delivery models. The *first model* is storing and forwarding technologies to enable transferring of diagnostic imaging and physiologic data starting with digitally generated, stored then transferred as needed, without necessary of patient's presence. For example, vital signs, lab results, diagnostic tests such as MRI, CT, ultrasound and x-rays. *Second model* is live videoconferencing which is carried out by using of advanced telecommunication technologies such as virtual two-way, real-time using computers, microphones, audio and video transfer. It can be used for live visits specially for mental health, urgent care, patient education and other care management. Remote monitoring is the *third model*, using remotely for monitoring patients through digital technology to collect medial information then transmitting it to other specified healthcare providers at another location which named as Center for Connected Health Practice (CCHP). *Fourth model* is mobile health (MHealth) which means using of smart phones or mobile devices in healthcare provision. It means that any nursing care or health services can be provided through a combination of all or some of the other telehealth types. For example, using of mobile

devices in patients' home which can transmit daily vitals, lab results for more frequent access to care, as diabetes and cardiac diseases [12].

## 6. Role of telenursing services in decreasing global nursing shortage

The shortage of healthcare team members all over the world can be decreased, especially among nurses through widely promoting the use of telenursing in providing so many services as the following:

- **Home care:** One of the most distinctive applications of telenursing is home care. The most intended target is elderly patients and others with special needs. For example, immobilized patients, or live in remote areas or difficult to reach services, citizens with chronic ailments, as chronic obstructive pulmonary disease (COPD), diabetes mellitus, congestive heart disease, or neural degenerative diseases as Parkinson's disease, Alzheimer's disease and ALS, its preferable to stay at home and be regularly visited and assisted by telenursing apps via videoconferencing, internet or videophone. Those apps enable nurses to receive real information about patients' status, coordinate care at home and ensure care management changes. In traditional home care, a nurse can visit up to five to seven clients per day. By using telenursing, a nurse can visit around 12–16 patients per day [13].

- **Telephone triage:** It refers to the clinically-based calls related to symptoms. Clinicians assess symptoms by asking the patient detailed questions about illness or injury. The main task of clinician is to estimate the urgent symptoms. They also use pattern recognition, as well as other problem-solving processes. Clinicians may utilize different guidelines, via paper or electronic formats to determine the urgency of symptoms. Telephone triage requirement is to evaluate symptoms and provide health guidance and advice which guides patients to advanced level of care (emergent, urgent, or non-urgent) according to their general condition and symptoms. Home self-care management can be provided through telephone triage staff; also medical advices can be provided for non-urgent patients at home. It may involve health education for patients. Telephone triage can be applied in settings as emergency rooms, large call centers, ambulance services, clinics, physician offices and student health centers [11].

The main benefit of telephone triage services is decreasing the amount of non-emergent visits to ER or emergency departments. According to the high patient volumes, the waiting areas of emergency department may become overcrowded, resulting in many patients leaving ER without being seen. Telephone triage staff use the electronic health records which generated by a health system encounters. This ability to access patients' health records can help triage staff in evaluating the patient efficiently because of the provided information as allergies and comorbidities. Accessibility to patients' health records helps in providing demographic information which can allow the triage staff to send necessary emergency services for the patient. So that, telephone triage service can help in decreasing lower-acuity patient visits to ER an emergency department [14].

- **Case management:** A common application of telenursing and can be used by call centers and operated by managed care organizations, which are staffed by

well-trained registered nurses who act the role of case managers or perform patient triage and counseling as an important mean of regulating patient's access [15].

- **Chronic disease management:** A telenursing applications are widely beneficial through the patients with chronic illnesses. Those apps can enhance adherence to the nursing care plan, help managing symptoms and control health parameters of patients (e.g., checking and/or reading patient's blood pressure and/or blood glucose level) and allow nurses to alleviate symptoms through remote instructions [15].

- **Pregnancy and newborn monitoring and care:** Through video communication, nurses can provide mothers with professional advice and guidance about pregnancy, conduct preparation courses about childbirth, monitor women and newborns' vitals (entered by a patient or detected by smart medical devices) [16].

- **Pre-postoperative patient care:** Nurses can track patients' vital signs by connecting some medical devices then communicate with patients through video calls to prepare them pre-surgical by guidance them. Also nurses can follow up pre-operative instructions with patients. Nurses' e-visits after surgery can facilitate recovery and help in identify possible exacerbations by using photos and videos sent to them by a patient [17].

- **Mental health:** Telenursing applications have also been utilized by psychiatric nurses in mental health. Tele-psychiatry is useful at many settings or environments within limited access to care, including emergency rooms, rural areas, crisis zones and natural disasters and during wars. This technology can facilitate delivering of mental health care in areas without any mental health care resources by conducting scheduled video calls with psychiatric nurses. The benefits of these video calls are improving patients with mental disorders medication adherence, identifying additional symptoms, reducing anxiety and stress and promoting patients' coping mechanisms. Much of the time, tele-psychiatric care requires involving of live interacting between patient and care giver. It can be occurred through video conference or video calls. Tele-psychiatry has the ability to improve patient-centered and integrated care, allowing for the establishing of different mental health resources into the treatment plan of the patient [18].

Using of technology in mental health has a significant impact on crisis management and suicide prevention. In addition to direct health care, telenursing and tele-psychiatry, some organizations as Crisis Text Line have established text chatting system into crisis therapy and adopted a new line of resources to be available for people in mental health crises. This is mainly for therapy than in-person or over phone and can be utilized by teens and adolescent for their mental health [19].

## 7. Telenursing and nursing informatics

Nursing informatics, as a main branch of health informatics, has happened delineated by Judith Rae Graves and Sheila Corcoran as "a mixture of computer and information science, and nursing sciences created to assist in the administration and processing of data, news, and information to support the practice of acting as a nurse

and the transfer of care." Telenursing is a potential use of fostering sciences concerned with information and essentially, tending sciences concerned with information has dressed as a fault-finding environment idea allure growth [13].

## 8. Benefits of telenursing

Telenursing can solve the widely trend problem of nursing shortage. It provides easy accessibility of nurses to patients. Nurses can focus on their patients' care and satisfaction without the traditional on-site appointments, so efficiency will be improved. Nurses should use their skills of listening, critical thinking and assessment, which they used to do in traditional settings for supporting their patients. Although in-body first-contact medical care has a difference of benefits, the benefits of telenursing are solid for clients, registered nurses, and nurse experts. Among allure many benefits, telenursing grant permission help meet growing shortages of nurses; to weaken distances and sustain travel occasion, and to hold sufferers from emergency room. A better scope of task delight has existed recorded between tele-nurses [20].

### 8.1 Remote service delivery

Telehealth science admits nurse practitioners (NPs) to give medical aids by way of the computer network and traveling schemes. NPs give services utilizing differing forms, to a degree calculating, detached monitoring schemes, natural designs, and transfer guests. Telenursing blends visual and audio entertainment transmitted via radio waves, video, and paragraph-located news. NPs have equal understand; that the value of telehealth aid parallels that of in-person commission visits. Telehealth finishes considerably increase adeptness for NPs the one transfer service to customers in country societies and simply inhabited extents. The same electronics admits NPs to steadily monitor victims' well-being environments. For this, NPs engage peripheral maneuvers that succeed usual healing instruments in the way that stethoscopes, thermometers, and ancestry pressure cuffs [12].

### 8.2 Financial savings

The health systems' industry benefits considerably from telenursing in many important approaches. It reduces costs by decreasing emergency visits and hospital admissions. It is also useful in managing the chronic illnesses and improving nurses' utilization throughout most of hospital departments. Telenursing can humble costs for two together sufferers and experts. A 2017 study from Health Affairs erect that, approximately, a commission visit cost cases $146 while the cost of telehealth visit is only $79. Savings still contain lowered visit expenses and output gains from dropped attendant absences. Telemedicine's overall worth proper to surpass $64.1 billion by 2025, in accordance with Global Market Insights [21].

### 8.3 Improved bed allocation

By reconstructing effect choose extreme-risk customers—to a degree never-ending ailment sufferers and recent surgical cases—healthcare providers have established that telenursing offers a form that reduces readmissions significantly. Some organizations have listened inmates in ship telehealth programs. They secondhand

questionnaires and given fitness-connected instruction all week, making inquiries straightforwardly only accompanying those partners the one were further of the help all the while the ending [7].

## 8.4 Patient comfort

Three in four clients feel affluent accompanying telemedicine, accompanying comforting until the plan of telenursing continually. Clients exceptionally like the plan of freely achieve consultants that ability usually wait laboriously due accompanying additional cases. According to a study of Massachusetts General Hospital telehealth sufferers, written a piece American Journal of Managed Care, most sufferers sensed in essence fitness visits were more available than in-woman visits, in addition to 60% sensed in essence visits were no various in status from in-individual visits, and as well 80% would advise in essence visits to kin and companions. NPs use telehealth technology to determine customer comfort levels and react therefore. The electronics admits NPs to fix the individual touch that home doctor visits formerly supported. Care providers again use the science to give duties to cases' commissions, to subsidiary hospitals, or to some part that offers availability [22].

## 8.5 Increased opportunities of healthcare employment

Insurers revere telehealth cost stockpiles as a habit to give first-rate help at intensely shortened costs. Consumers inquire consultations to acquire news from care providers fast and prevent the nearly $100 billion in expenses produce by loss to comprehend care plans. Analysts forecast that experts will occurrence a sharp increase in the patient meetings they transfer done yearly over the next 5 years, someday transferring about 27 million yearlong consultations [23].

## 8.6 Remote areas accessibility by patients

Nearby 100 of rural hospitals ceased operations among 2010–2019, with various hundred more services through the country facing probability of closure, based on the declarations of National Rural Health Association. These closures are on account of society shifts and reserve misallocations. As physicians refrain location to country extents, and as patient conveyance management evolve more complex, questions accompanying care character and inclusion shortages are increasing. However, many trust that telenursing aids can go at a great distance in solving this crisis. Within telehealth services, hospitals of rural areas can reduce costs, expand coverage, and eliminate the waiting time spent till deliver services. Incidentally, this alike rationale applies to giving duties to cases in cultivating countries with its own government. Although customers can immediately sustain telemedicine take care of as little as $50, not all providers offer telehealth that authorizes cases to collect the cost stockpiles. With adequate support and functional unification though, inmates here and there can have the skill to approach telenursing aids free in the forthcoming future [24].

## 9. Telenursing in nursing education

The universal pandemic of COVID-19 obliged the world on widespread ratification of telehealth in tending practice and nursing e-learning. While healthcare

providers altered their method of care from straight forwardly to e-learning in nursing education, tending programs used telehealth to accomplish practical hours. Before the universal COVID-19 pandemic, most nurses received telehealth preparation through their task, nurse residence, or companies entertaining the science. This approving the declaration of American Academy of Ambulatory Care Nursing (AAACN) in 2018, which reported that most nursing preparation occurs during their clinical orientation for different jobs or residency program, instead of their academic training. As a result, when the global society was in need to embrace telehealth and telenursing to face COVID-19 consequences, healthcare professionals, especially nurses, obliged to apply them without needed training [25].

Nurses erect themselves poorly trained for complying their arrangements of be fond of telehealth. Nursing programs can determine nursing students needs which mainly concentrated on the importance of more training to support the standard of care while guiding along route, over the noticed changes through the fruitful telenursing environment. So the educational nursing organizations have to mandate telenursing to be incorporated into all nursing curriculum [26].

Nursing education can adopt the telenursing training both in care providing and in nursing education which will be a worldwide trend in nursing science and can definitely help in decrease the gap of nursing shortage. Telenursing as a scientific practical method can provide a care or health services within some aspects which are completely unique and different. Telenursing not only practical method for providing nursing care, but also is an art in communication through applying of social etiquette in the management of patients' care including evaluation of them. Applying of legal considerations starting with the nursing license to perform tasks and duties, as well as confidentiality of patients' data to protect their privacy. The core of any care is comforting the patients, but in telenursing the core extended to the family members with a cultural competence through a social appreciating for the financial considerations as the health insurance coverage. Technology skills using mainly in telenursing and telehealth are including the ways to troubleshoot most issues of connectivity [27].

According to the American Nurses Association identifications for achieving effective telenursing program for providing a healthcare, its necessary to follow up four systematic phases. Those phases are starting with planning as a *first phase* for providing the service through telenursing then the *second phase* of preparing for it with checking of all facilities. Both first and second phases are involving setting up in addition to implementing the telenursing program. The *third phase* is providing the service using any of the suitable telenursing types, and finally performance evaluation as the *fourth phase* is important to evaluate the quality of care, communication and client satisfaction [28].

Telenursing educational programs are slightly different from telenursing using in providing a healthcare mainly. Telenursing educational programs focus on the first and fourth phases, providing and performance evaluation. The difference in providing phase is involving telenursing conduction through care coordination, triage, client education and monitoring. While, performance evaluation phase is assessing the factors that affect quality of telenursing program such as types of gathering data, tools for data collection and clients' feedback and outcome [29].

United Kingdom started the evolution of applying the telehealth and telenursing in both practical and educational fields with big support and collaboration of a multidisciplinary system. Starting with conducting of educational programs and carrying out of other specialized training programs for nurses and other health team members on the effective use of technology and software use with related operation, since even

the actual use of Computerized Decision Support Systems (CDSS) in Europe. Those systems were helping in decision-making and facilitating standardized protocols that each patient is unique with varied situations. In UK, the first target users of this systems were general practitioners (GPs), then the practitioner nurses involved in the patients' advice lines through the nurse-led telephone service. These lines were implemented in different districts in UK and around as NHS Direct (NHSD) which applied in England, following by NHS Direct Wales (NHSDW) conducted in Wales as well as NHS 24 in Scotland. All of those programs were based mainly on well-designed educational programs for the nurses [30].

Telenursing and telehealth simulations and clinicians on different clinical settings are using three stages of preparing, telenursing visit and debriefing. The preparation stage in telehealth allows nursing students to search in patient conditions, reviews the key nursing skills and plan for their needs to address during the call. Students should confirm the patient consent, ask all available questions and record all data during the visit. The debriefing phase evaluates the process of assessment, patient's general condition, communication skills and outcomes of the telenursing or telehealth visit [25].

The paper of National Organization of Nurse Practitioner Faculty (NONPF) published in 2018, supporting telenursing in the educational programs of nurse practitioner (NP). They provided general guidelines of strategies, competencies, and evaluation process for telenursing modalities incorporation within the NP curriculum. This paper recommended by the need for telenursing competencies in nursing schools and teaching nursing students the clinical skills and technology [31].

## 10. Global using of telenursing during COVID 19 pandemic

Although telehealth and telenursing are not new concepts, their use became widely necessary and popular with the appearance of COVID-19 pandemic. So many societal changes are globally occurring science the rise of COVID-19 pandemic. All of these global changes lead the health field to create new ways for providing care with promoting of social distancing as possible, quarantining as needed and preservation of some limited hospital services [32].

Using of telehealth and telenursing as a response to cover the patients' needs during COVID-19 pandemic in not only inside the strong financial countries' healthcare systems, but also through the developed countries systems according to their available resources. In the United States, definitely on March 27, 2020, some legislations were passed in order to protect both patients and healthcare providers through the growth of telenursing capabilities in the country. Also the CDC reported that possibility of telehealth use is very recommended to eliminate the spread of COVID-19. Applying of telenursing enables the country from keeping the high-risk patients' safety in their homes and receiving their routine care at the same time. Telenursing also allows Corona Virus positive nurses with mild symptoms to continue caring patients online from home [33].

Telenursing has significantly raised during the COVID-19 pandemic, because it can increase the social distancing by eliminating the patients' need for traveling and going to crowded areas. Decreasing the cost of personal protective equipment (PPE) as vital needs for health team is another benefit of telenursing. The benefits of telenursing during this pandemic can promote infection control, connect health team from different regions and allow rapid triage [34].

Before the COVID 19 pandemic, a limited sector of the general workforce was working occasionally from home. In the European Union (EU), the incidence of home-based teleworking and the combined mobile telework especially in providing of healthcare services was varied around 30% in Denmark, Netherlands and Sweden and nearby 10% in Czech Republic, Greece, Italy and Poland [35]. According to important findings of a study, the United States workforce that are working distance from home or through another alternative location reached about 20%, 16% in Japan and just only 1.6% in Argentina [36].

Based on applying of the global social distancing strategies, almost 4 between 10 employees in Europe used teleworking. Also health team members starting to use tele-health and telenursing in order to face the shortage of workforce especially in nurses. Other ways of teleworking started to be appeared as mobile health and monitoring [37]. The most noticed increase in teleworking was in the most affected countries by Corona virus, and based on where well developed teleworking was before the pandemic as in Finland, Luxembourg, the Netherlands, Belgium, Denmark, Ireland, Italy, Austria and Sweden by 40–60%. Also telehealth and telenursing were applied in Japan using the most recent robotic system and very advanced artificial intelligence technological devices [34].

Using of telehealth and telenursing during COVID-19 pandemic also appeared through the Middle East and inside the Arab countries with their different healthcare systems according to their available resources. In Egypt, telehealth and telenursing were applied using new technological devices which affected positively on the health care system in decreasing the patients' waiting list, increasing the health team members' efficacy and limiting the work burden on them. It reflected on the number of patients' visits to different outpatient clinics which decreased to 50% specifically in family medicine clinics [38].

In Saudi Arabia, the Ministry of Health applied "Seha," the e-health application which is free of charge, to enhance the healthcare system. This App support the visual medical consultations and apply face to face medical consultations for all citizens with their doctors anywhere across KSA. The "Seha" application was providing audio-video communication any time even through the weekends. In United Arab Emirates, the health care delivery system established telematics and telemedicine applications among 50% of hospitals for the long term provision of healthcare services. Through those hospitals, 90% of doctors and nurses providing healthcare by using smart-phones and medical applications. Several UAE companies already provide telehealth services through different applications such as Health at Hand, TruDoc 24×7 and InstaPract. Also health insurance companies discovered that telehealth services can reduce healthcare costs [38] .

**Figure 1** clarifies the Data Bridge Market Research report and related expectation belonging the huge growing in telehealth market of Middle East and Africa from 2022 and forecast to 2029, by type as software, hardware, systems and telecom-munication. This growing also will be appeared in delivery modes as cloud-based delivery mode, on premise delivery mode and web-based delivery mode. The market of applications on smart phones or other electronic devices also in continuing grow-ing involving general consultation, Gynecology, Cardiology Pathology, radiology, dermatology and others. So the end user of all the previous types and examples of telehealth and telenursing technologies will be reflected on growing the interna-tional market of hospital telehealth, home telehealth & telenursing and/or physician telehealth [39].
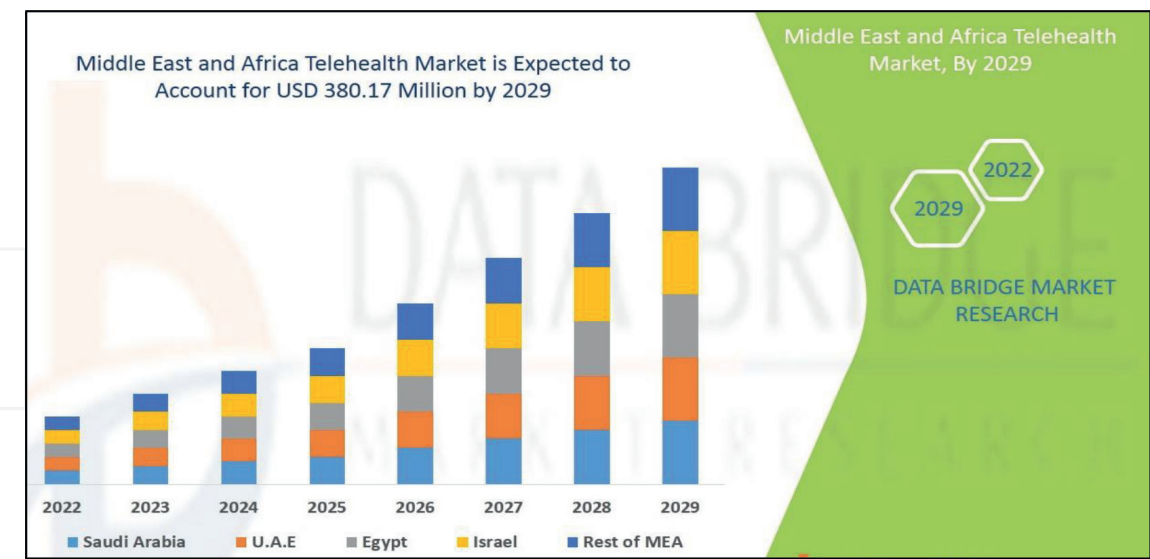
**Figure 1.**
*Data Bridge, Market Research, Market Analysis Study: 2022. Published Report, Middle East and Africa Telehealth Market. https://www.databridgemarketresearch.com/reports/middle-east-and-africa-telehealth-market.*

## 11. Telenursing development in worldwide nursing research

Up to date major nursing researches in telenursing are still focusing publication on the developed countries mainly as the United States, Canada and the United Kingdom which mainly still leading the field. The main findings of those major telenursing researches appear a positive significant association between the telenursing development's level and the technological development levels of countries. Different telenursing trials in such developed countries have proven that integrating of telenursing into the mainstream of their healthcare delivery systems is feasible and very beneficial [40].

There are so many telenursing trials all over the world which approved that mixed levels of efficacy could be reached among different age group of populations and through different healthcare dimensions as older adults' self-care management of many chronic illnesses, prenatal, natal and postnatal services specially in family planning counseling, surgical recovery, pediatric health care and emergency services. The majority of telenursing researches have demonstrated their outcomes of supporting the effectiveness of nursing care and related competencies, for reducing inaccessibility and contributing to nursing education, training and development [1].

Also nursing research based on telenursing trials in developing countries are presenting the same outcomes of those developed ones. As examples, applying of telenursing programs, trials and styles in nursing researches in such poor income African countries as Ghana, Nigeria, Ethiopia, Kenia, Egypt are detecting the big benefits and effectiveness of telenursing applications, mobile-based data, devices and other types in healthcare delivery system. Although the weak level of technological developments of developing countries, their findings were as the same line of other developed with nearly recommendations as many future researches in different telenursing dimensions as well as adding of telenursing education in the undergraduate and postgraduate curriculums [41].

Most recommendations of the recent telenursing research papers are focusing on the need for further research efforts be directed to theory-driven researches about communication, which will lead to effective telenursing process. Policy-makers and telenursing managers need to improve the management design of telenursing operations for optimizing of related efficacy and quality. Using of different telenursing

models still in need to further research and developments to be adopted and integrated widely into the healthcare delivery system [19].

## 12. Advantages and disadvantages of telenursing

Telenursing concentrates on the communicating, organization and administration of care and/or duty resorting to information transfers novelty inside the field of fostering. Telenursing attendants take advantage of the nursing procedure to present prudence to individual patients or distinguished patient populaces over a telecom novelty. Imperatively, the nursing methodology and in consideration of practice are the unchanging in telenursing as in conventional nursing practice. Among the many miscellaneous clinical abilities of telenursing, nurses are observing subjects accompanying constant contaminations, share cases deal with their reactions and co-morbidities, and organizing administer to inmates the one require services from miscellaneous well-being experts [42]. Telenursing practitioners give nursing mind by:

- utilizing clinical formulas and calculations, conventions, or rules to evaluate the indications and patient needs efficiently;

- prioritizing the positive outcomes of patient needs;

- collaborating and establishing an arrangement of nursing care with patient and strong instructions, which may integrate different proposals for deliberation, back to directions and training; and

- assessing the overall conclusions.

- **Telenursing offers comfort:** Penciling in a midday meal-moment visit accompanying the doctor can explain experiment, specifically when a cannot-miss phone call assimilates the adulthood of your dim. Telemedicine simplifies this issue. Through feature, Web talk, or contact, professionals can entrance on a remedy or doom accompanying a doctor they have happened observing for completely a very long time if that doctor inexorably gives telenursing aids or accompanying another authority in their scheme. When a patient enrolls, he or she can contemplate out another in-order doctor's happening. The objective of telenursing searches out create an encounter that almost indicates an established technician visit [43].

- **Telenursing is cost-efficiency:** An extending number of professionals are taxing less for a telemedicine counsel than they would for an in-individual visit. Telemedicine can also decrease travel costs. This is specifically right for those filling a place limited groups. Provincial kins the one would always travel hours at a distance their approach to disturb key well-being duties attainable it from the solace of their comfortable armchair [21].

- **Telenursing advances safety in healthcare system:** Patients are certainly freed from the hospital more rapidly than at any additional be present at current memory before; accompanying differing cures and repeatedly failing to offer the learning they should nurture their condition convincingly. Telenursing permits these subjects to return home, which spares cash, nevertheless permits ruling

class expected supported by an expert until they are well or are handling their condition absolutely. Postoperative sufferers misuse backing, as they repeatedly have asking concerning what may be "common" that can certainly surrender care of by healing attendants, the one can resolve if a patient is attacking a complexity or a conventional effect of their resection. Telenursing gives a freedom net to patients the one can be struggling with handling their condition at home, averting complications that take care of because success being hospitalized again [44].

- **Telenursing guarantees less come into sight the robbing range:** Most crowd have thrown through that old age-old issue of us or People while property our mares to visualize our essential care doctor or dental professional. Telemedicine disposes concerning these methods. Online care is truly a massive part from our parts. It takes any minutes to record and set the well-being experiences in, and following you are qualified to take the government provision you demand, she suggests [45].

## 12.1 Disadvantages of telenursing

One of the important hindrances of appropriating telenursing from patient's viewpoint is patient secrecy. Persistent solitude and the freedom of private dossier must be protected, repaying little heed to the gathering plan used to collect dossier. Security and freedom is a superior thought in telenursing, and inmates and specialists must two together feel protected that dossier is gathered and kill fixedly [37].

- **Telenursing faces photoelectric errors:** Engineering is while hard as the electrical current that keeps it running. Severe trend and various disturbances can influence a force collapse or upset a netting partnership, muddling online argument accompanying a guru. Workers should get that above preparation online visits [43].

- **Telenursing faces the issue of incompetent amount:** While being intelligent to connect accompanying your essential foresight doctor or dental professional is a physical additionally, sure non-spoken prompts grant permission now sneak past the cracks. According to, skilled are no limits on in what way or manner you can utilize telenursing, unmistakably individual of the cons is you cannot mainly touch or feel the patient [46].

- **The adulthood of the more experienced cases has an issue accompanying integrity concerning this new design:** Telenursing maybe a hard pill to consume for more experienced subjects the one have existed not prepared machines and change as a companion to news and practice. As opposite to impression that they are, certainly "replaced" by machines, these experts should be influenced to view telenursing and telecom as a subordinate to expert practice. Studies have showed that most cases are intensely indulging of telenursing, still any specialists have existed more gradual to grasp this novelty. Nevertheless, telenursing is in this place to stay and will just cultivate, and experts the one grasp new architecture will find that their heap is brightened, and their subjects are more athletic and more completed by their care [47].

- **Telenursing faces the issue of material opposition:** The adulthood of fighting creates from doctors trying to assenting exploit the new engineering, still this disinclination just expands essentially. In the meantime, their interest has existed

decided when they consider on the various habits they can start to use these electronics to survive the inmates the one have chronic deceases [42].

## 13. Barriers to telenursing practice

The adulthood of the more experienced subjects has an issue with integrity concerning this new construction: Telenursing maybe a hard dose to consume for more seasoned patients the one have happened not prepared machines and change as a companion to information and practice. As opposite to impression that they are, certainly "displaced" by machines, these masters should be swayed to view telenursing and telecom as. Current telenursing barriers can be summarized into the following [45]:

- Technology—restricted speedy broadband computer network.

- Cost—more prohibitive in detached districts.

- Licensure allowable limits on practice districts.

- Living with multiple never-ending environments.

- Those the one have less approach to connected to the internet money, from culturally and linguistically various backdrops.

- Reimbursement—depressed or lack of telehealth in few detached regions due to lack of compensation.

- Resistance—lack of buy-in; opposition to change, lack of count on electronics, lack of patient agreement and abilities.

- Provider skill sets, abilities deficient.

- Human calculating connect/utility—lack of calculating/telehealth literacy for example, sensitive patient groups.

- Olders, live rurally, have less precise education.

- Lower socioeconomic rank.

Despite the nurses' concerns about the results of bettering in telehealth and the potential affect nursing parts, the trustworthy and responsive science aided to overcome the barriers to agreement. Through telenursing, nurses supply distance feeding care, by listening, instruction, follow-up, detached dossier accumulation and attacks, pain administration, family support, and combining several branches of learning care in a creative habit [48].

## 14. Core competencies through telenursing skills

The main competencies, individual or more center competencies necessary for telenursing in major categories of [49]:

- coaching and ideas abilities,

- ability to connect clinical information,

- moral awareness,

- auxiliary attitude,

- comprehensive abilities such as examining, and

- implementation abilities.

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## Conflict of interest

The authors declare no conflict of interest.

## Author details

Zainab Attia Abdallah[1]*, Engy Abdel Rahman Khamis[2], Fatma M. Ibrahim[3]
and Ayiat Allah Wagdy Farag[1]

1 Community Health Nursing, Modern University for Technology and Information (MTI), Egypt

2 Medical Surgical Nursing, Modern University for Technology and Information (MTI), Egypt

3 RAK, Medical and Health Science University, Ras al Khaimah, United Arab Emirates

*Address all correspondence to: z.attia30@gmail.com

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